# CONVERSIONS & FORMULAS

**Area:**
**1 square ft.** = 144 square inches
**1 square yd.** = 9 square ft.
**1 cubic yd.** = 27 cubic ft.

**Chemical Dosage:**
All these formulas require to be divided by % of strength**.**
**Flow—Chemical by weight:**
**lbs/day** = MGD x 8.34 x PPM, or
**lbs/day** = gpm x .012 x PPM (if you want to leave it as gal/min, I would suggest parenthesis)

**Circular Area =** .785 x Diameter$^2$ or
3.14 X Radius$^2$ ( pi x R$^2$) ( pi = 3.14)

**Circular Volume:**
Area x Height or Length

**Circumference:**
3.14 X Diameter (Pi x Diameter)

**Concentration:**
**1 part per million (ppm)** = 1 milligram per liter
=0.0584 grains per gallon
=8.34 Pounds per MG
1 pound of weight per million pounds
1 part per billion = 1 mg/L (microgram/Liter)

**CT =** Chlorine Concentration (mg/L) x Time (min)

**Detention time =** $\frac{\text{Tank Volume (gallons)}}{\text{Flow (gpm or gpd or gph)}}$

**Dilutions =**
$V^1 \times C^1 = V^2 \times C^2$
$V^1 \times C^1 + V^2 \times C^2 = Vt \times Ct$
(t equals totals of 1 & or 2)

**Efficiency:**
**% Efficiency** = $\frac{\text{out power}}{\text{input power}}$

**Filtration Rate (gpm/ft2) =** $\frac{\text{Flow (gal/min)}}{\text{Surface Area (ft}^2\text{)}}$

**Flow—Chemical by volume:**
Gallons/day = MGD or gpm x PPM

**Flow Rate =**
Q (flow ft$^3$/sec.) = V (velocity ft/sec.) x A (area ft$^2$)

**Flows:**
**1 gallons per minute** = 1,440 gallons/day
**1 cubic foot per second (cfs)** = 646,272 gallons/day
= 448.8 gallons per minute
**1 million gallons per day** = 1.55 cubic ft/sec.=
694.4 gallons per minute

**Force =**
Pressure (psi) x Area (inches$^2$)

**Horsepower:**
**1 horsepower** = 550 foot-pounds/second
=33,000 foot-pounds/minute
=1,980,000 foot-pounds/hour

Break Horsepower = $\frac{\text{Water Horsepower}}{\text{Pump Efficiency}}$

Motor Horsepower = $\frac{\text{Brake Horsepower}}{\text{Motor Efficiency}}$

Water Horsepower = $\frac{\text{Q (flow gal/min.) x H (Head in ft.)}}{3960}$

Kilowatts (kW) = 0.746 x Motor Horsepower

**Hydraulics:**
**2.31 Head Feet** = 1 PSI
**0.433 PSI** = 1.0 Feet of Head

**Lengths:**
**1 foot** = 12 inches
**1 yd.** = 3 ft. = 36 inches
**1 mile** = 5,280 ft.

**Per Capita Water Use =**
Water used (gal/day)**/**total number of people

**Percent =**
$\frac{\text{Part}}{\text{Whole}} \times 100$

**Percent Strength by Weight** =
$\frac{\text{Weight of Solute}}{\text{Weight of Solution}} \times 100$

**Power (Electrical):**
**Kilowatts (kW)** = 0.746 x Motor Horsepower

**Specific Capacity =** $\frac{\text{Flow (gallons per minute)}}{\text{Well Drawdown (feet)}}$

**Specific Gravity =**
$\frac{\text{Solution weight (lbs/gal)}}{\text{Weight of Water (8.34 lbs/gal)}}$

**Square or Rectangle Area =**
Length x Width

**Surface Loading, GPD/sq. ft. =** $\frac{\text{Flow (gal/day)}}{\text{Surface Area (sq ft)}}$

**Temperature:**
**Degree Fahrenheit** = Degree C x 9/5 +32
**Degree Centigrade** = (Degree F –32) x 5/9

**Time:**

**1 minute** = 60 seconds
**1 hour** = 60 minutes = 3600 seconds
**1 day** = 24 hours = 1,440 minutes = 86,400 seconds
**1 week** = 7 days
**1 yr.** = 12 months = 52 weeks = 365 days

**Volume and Capacity:**

**1 cubic ft.** = 7.48 gallons
**1 cubic yd.** = 27 cubic ft.
**1 quart** = 2 pints = 32 fluid ounces
**1 liter** = 1000 milliliters = 1.06 quarts = 1000 cubic centimeters
**1 gallon (gal)** = 8 pints = 231 cubic inches = **3.785 liters** = 3,785 milliliters
**1 acre foot (ac. ft.)** = 43,560 cubic feet = 325,851 gallons

**Weight:**

**1 pound** = 16 ounces = 7000 grains = 453.6 grams = .454 kilograms
**1 kilogram** = 1,000 gm = 2.205 pounds
**1 ton** = 2,000 pounds
**1 gallon of water** = 8.34 pounds
**1 cubic ft. of water** = 62.4 pounds
**1 liter of water** = 1 kilogram = 1000 grams
**1 milliliter of water** = 1 gram
**Density of water** = 1gm/ml or 1gm/cc
**Specific gravity of water** = 1.00
**Weight of Solution** = Weight of Solute + Weight of Solvent

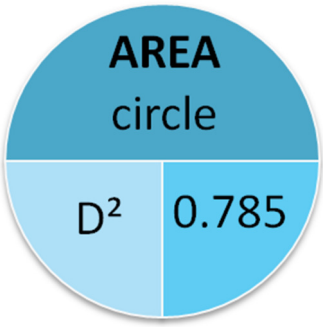
**Wire to Water Efficiency:**

**Overall Efficiency**= $\frac{\text{Water Horsepower}}{\text{Electrical Horsepower}}$ x 100

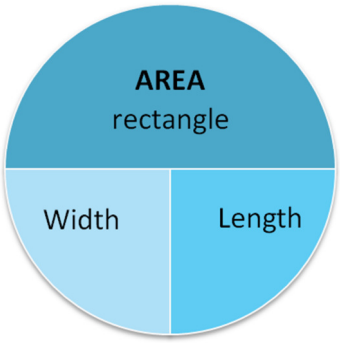
**PIE WHEELS**

- To find the quantity above the horizontal line: multiply the pie wedges below the line together.
- To solve for one of the pie wedges below the horizontal line: cover that pie wedge, then divide the remaining pie wedge(s) into the quantity above the horizontal line.

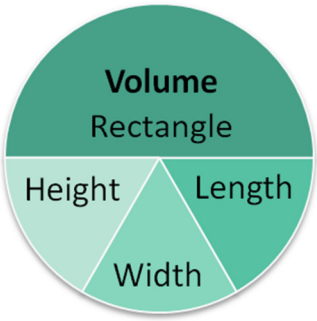
## Area of a Circle



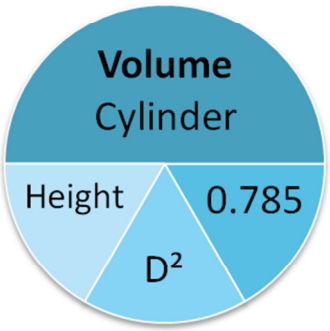

## Area of a Rectangle



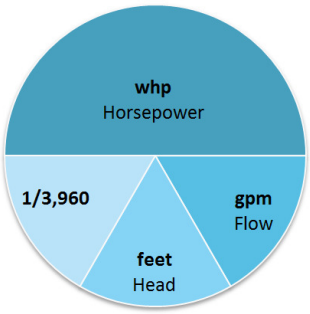

## Volume of Rectangular Tank



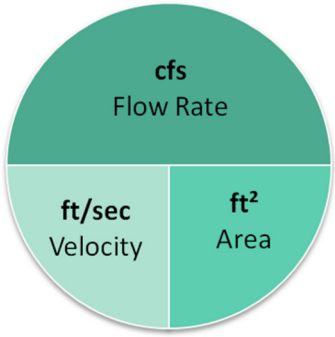

## Volume of Cylinder



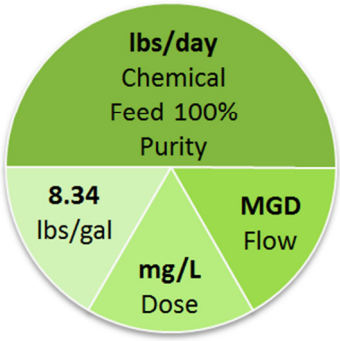

## Horsepower, Water (whp)

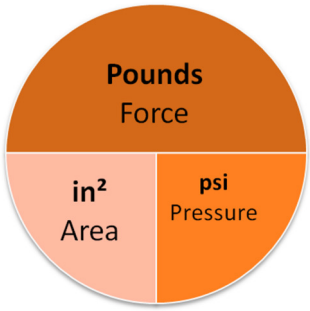



## Flow Rate, cfs




## Feed Rate, lbs/day




## Force, pounds